

REMARKS

One new drawing sheet is inserted and the specification is amended accordingly herein.

Claims 1 and 6 are amended herein.

Support is found, for example, at page 5, lines 9-14 and lines 17-19 and in the original claims.

No new matter is presented.

I. Requirement for a Drawing

In paragraph 3 of the Office Action, the Examiner has indicated that the subject matter of this application admits of illustration to facilitate understanding of the invention and therefore Applicants are required to furnish a drawing under 37 C.F.R. § 1.81(c).

A new drawing is submitted herewith and the specification is amended accordingly. The Examiner's approval of the new drawing is requested.

II. Response to Claim Rejections under 35 U.S.C. § 112

A. "the back" and "the edges"

In paragraph 5 of the Office Action, the Examiner has rejected claims 1 and 2 under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically, the Examiner states that claims 1 and 2 recite the limitations "the back" and "the edges" in lines 3 and 4 of the claims and there is insufficient antecedent basis for these limitations in the claim. Further, the Examiner states that it is unclear what is considered "the back" and "the edges" of the semiconductor element.

Claim 1 is amended herein to recite “a back and edges” to correct an informality.

Applicants further submit that in view of the description in the present specification and further in view of the new drawing, one of ordinary skill can readily ascertain the meaning and scope of the present claim language.

Accordingly, Applicants request withdrawal of this rejection.

B. “tackiness”

In paragraph 6 of the Office Action, the Examiner has rejected claims 1 and 2 under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. According to the Examiner, the term “tackiness” in claim 1 is a relative term which renders the claim indefinite because the term “tackiness” is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is the Examiner’s position that all materials have some level of “tackiness” simply because they are capable of being measured with a tack test, such as the ball tack test.

Applicants respectfully traverse this ground of rejection.

The fact that claim language includes relative terminology does not necessarily render a claim indefinite. The proper inquiry is to first determine whether the specification provides some standard for measuring degree and second whether one of ordinary skill in the art would understand what is claimed in light of the specification. In this case, “tackiness” is defined in the specification on page 4, lines 5-6, as preferably from 2 to 15 in terms of ball tack measured at the time of use and “ball tack” is determined by a known ball rolling method as provided for in JIS

Z-0237 as described at page 6, lines 21-23. Further, the Examples provide a standard for ascertaining the tackiness based upon the results of the tests carried out. Thus, one of ordinary skill in the art would sufficiently be apprised as to the scope of the invention.

Additionally, Applicants disagree with the Examiner's statement that "all materials have some level of tackiness". It is clearly understood by those of ordinary skill in the art that there are some films that have no tackiness. This is further supported by the "ball tack test" described below.

Accordingly, Applicants respectfully request withdrawal of this rejection.

C. "rubber-containing or rubber-modified polycarbodiimide resin"

In paragraph 7 of the Office Action, the Examiner has rejected claim 6 under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner asserts that the manner in which the claim is written renders the claim indefinite because it is unclear what is included and excluded from the claim language. The Examiner also states that it is unclear whether the claimed material requires polycarbodiimide resin or not.

Claim 6 is amended herein to recite that the thermosetting sheet material is a rubber-containing polycarbodiimide resin or rubber-modified polycarbodiimide resin, thereby clarifying the claim language and obviating the rejection.

Accordingly, Applicants respectfully request withdrawal of this rejection.

D. “2 to 15 in terms of ball tack”

In paragraph 8 of the Office Action, the Examiner has rejected claim 7 under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. According to the Examiner, the claim is unclear because no units are specified in the claim. The Examiner states that the ball tack test measures and reports the distance of the ball from the endpoint of the tack apparatus; therefore, any units can be used for the numbers 2 to 15, such as centimeters, or millimeters, or inches, or feet or any arbitrary or proprietary units. Thus, the Examiner asserts that no matter what the material, the units can be arbitrarily set to yield a ball tack value of 2 simply by choosing a unit length that fits to the ball tack being from 2 to 15. Therefore, the Examiner concludes that any thermosetting material meets the claim.

Applicants respectfully traverse the rejection and submit that the Examiner is incorrect. There is no unit for the ball tack test. The ball tack test is a test for measuring tackiness defined in accordance with JIS Z-0237. In this test, a sample is fixed on an inclined surface with the adhesive surface thereof up, and stainless steel balls having different diameters are rolled on the adhesive surface. Tackiness is then determined by the number of the ball having the largest diameter among the balls which are adhered to the adhesive surface. The ball having a larger number has a larger diameter, and therefore, the degree of tackiness can be determined by the ball number. Accordingly, there is no unit for the ball tack test. In this regard, Applicants note that this term is commonly used and understood in the art as can be seen by Nishikawa ‘465 (of record in the present application), which also mentions ball tack. See, e.g., column 14, lines 36-39 and the Table at columns 15-16 (Table 2) of Nishikawa ‘465.

Accordingly, Applicants respectfully request withdrawal of this rejection.

III. Response to Claim Rejections under 35 U.S.C. § 102

A. Igarashi '546

In paragraph 10 of the Office Action, the Examiner has rejected claims 1-2 and 6-7 under 35 U.S.C. § 102(b) as allegedly being anticipated by Igarashi '546.

Applicants respectfully traverse the rejection.

Igarashi et al does not disclose, teach or suggest a "thermosetting sheet material" as recited in present claim 1. Specifically, as indicated in the Response filed April 5, 2006, the term "thermosetting" is used only at lines 27-28 of column 5 of Igarashi et al in the context of "a thermoplastic or thermosetting bonding agent". Thus, a sheet having a thermosetting property is not disclosed, taught or suggested by Igarashi et al. For at least this reason, the present invention is not anticipated by Igarashi et al.

In the Action, the Examiner states, "the epoxy-rubber-resin of Igarashi meets the claim". See page 6, the 4th line from the bottom, of the Action.

However, as pointed out in the arguments presented in the Amendment filed on October 25, 2005 and in the Appeal Brief submitted April 25, 2007, Igarashi et al teaches that the semiconductor chip is sealed by bonding a bonding sheet using an epoxy-rubber resin as a bonding agent. This does not mean that the bonding sheet itself is an epoxy rubber resin and therefore it does not follow that the bonding sheet contains rubber and necessarily has tackiness. Rather, the use of the epoxy-rubber resin as a bonding agent suggests to one of ordinary skill in the art that the bonding sheet itself does not have tackiness.

Further, there is no description in Igarashi et al which teaches or suggests that the bonding sheet itself contains rubber or has tackiness. Searching the full text of Igarashi et al, the term “rubber” is used only at lines 21 and 37 of column 7 within the context of “a bonding seat [sic] 33 (e.g., epoxy-rubber resin as bonding agent (emphasis added)”. Thus, a sheet having rubber therein is not taught or suggested.

In addition to the above, Appellants have submitted an executed Declaration by Mr. Hideyuki Usui, one of the co-inventors named in Igarashi et al in support of the position that Igarashi et al does not teach an epoxy rubber bonding sheet as asserted by the Examiner. Specifically, in the Declaration Mr. Usui confirms that the bonding sheet 33 of Igarashi et al uses an epoxy rubber resin as a bonding agent which makes it clear to one of ordinary skill in the art that the bonding sheet 33 of Igarashi et al does not itself contain a rubber and does not necessarily have tackiness as asserted by the Examiner. Additionally, Mr. Usui explains that there is a difference between the bonding agent of Igarashi et al and the bonding sheet of Igarashi et al.

Further, Mr. Usui confirms that there is no disclosure, teaching or suggestion of a thermosetting bonding sheet in Igarashi et al.

Moreover, as discussed above, the Examiner’s statements that all materials have some level of tackiness and that the epoxy-rubber-resin of Igarashi ‘546 meets the claim because the units can be arbitrarily selected to meet the claimed range of 2 to 15 are not technically correct. For these additional reasons the epoxy-rubber-resin of Igarashi ‘546 does not meet the element of a thermosetting sheet material.

Therefore, the evidence of record shows that Igarashi '546 does not disclose, teach or suggest "a thermosetting sheet material" and as such Igarashi '546 does not disclose, teach or suggest a thermosetting material having tackiness". For at least these reasons, the present invention is not anticipated by Igarashi '546.

Accordingly, Applicants respectfully request withdrawal of the rejection.

B. Yamamoto '404

In paragraph 11 of the Office Action, the Examiner has rejected claims 1 and 2 under 35 U.S.C. § 102(b) as allegedly being anticipated by Yamamoto '404.

Applicants respectfully traverse the rejection.

Yamamoto '404 teaches a semiconductor device which comprises a substrate and a semiconductor element mounted thereon *through an adhesive film*, (not a bump bonding part) wherein at least areas where the semiconductor chip terminal and the wiring are connected are encapsulated with a resin. See, e.g., paragraph [0017] and Figures 4 and 6.

The Examiner refers to element 9 in Figure 6, for example, as a bump bonding part; however, this is not correct as it is described at paragraph [0145] that element 9 is wiring. Thus, Yamamoto '404 does not teach all elements of independent claims 1 and 2 and therefore cannot be said to anticipate the claimed invention.

Additionally, the encapsulating material of Yamamoto '404 is described as a liquid encapsulating material, e.g., at paragraph [0145], not a sheet material as recited in present claim 1. Thus, for this additional reason Yamamoto '404 does not teach all elements of independent claims 1 and 2. For at least this reason Yamamoto '404 does not anticipate the present invention.

Further, as discussed above, the Examiner's statements that all materials have some level of tackiness and that the "thermosetting rubber-containing material" of Yamamoto '404 meets the claim because the units can be arbitrarily selected to meet the claimed range of 2 to 15 are not technically accurate. Even if the units can be arbitrarily selected to meet the claimed range of 2 to 15, Yamamoto '404 teaches that the liquid encapsulating material is an epoxy type encapsulating material (paragraph [0150]), which does not meet the element of a thermosetting sheet material. For these additional reasons the present invention is not anticipated.

Accordingly, Applicants respectfully request withdrawal of the rejection.

C. Ueda '688

In paragraph 12 of the Office Action, the Examiner has rejected claims 1 and 2, and 6 and 7 under 35 U.S.C. § 102(b) as allegedly being anticipated by Ueda '688.

Applicants respectfully traverse the rejection.

First, there is no description in Ueda '688 of sheets having tackiness.

Additionally, in Figure 2, Ueda '688 describes a chip (20) fixed to a substrate (22) with a sheet resin composition (2) thermally melted and cured to underfill the interface between the chip (20) and the substrate (22). Ueda '688 does not disclose, teach or suggest that the semiconductor element is "encapsulated" as required in independent claims 1 and 2 of the present application. For at least these reasons Ueda '688 does not anticipate the present claims.

Further, as stated above, the Examiner's statements that all materials have some level of tackiness and that the "thermosetting rubber-containing material" of Ueda '688 meets the claim because the units can be arbitrarily selected to meet the claimed range of 2 to 15 are not technically accurate. For these additional reasons the present claims are not anticipated.

Accordingly, Applicants respectfully request withdrawal of the rejection.

D. Hotta '096

In paragraph 13 of the Office Action, the Examiner has rejected claims 1 and 2 under 35 U.S.C. § 102(b) as allegedly being anticipated by Hotta '096.

Applicants respectfully traverse the rejection.

In the present invention, a semiconductor element is encapsulated with a thermosetting sheet material having tackiness. On the other hand, Hotta '096 does not disclose, teach or suggest encapsulation with a sheet having a tackiness. In Hotta '096 there is only a description about filling an encapsulation resin. There is no description about encapsulation with a sheet having tackiness. For at least this reason, the present invention is not anticipated by Hotta '096.

Accordingly, Applicants respectfully request withdrawal of the rejection.

E. Misumi '484

In paragraph 14 of the Office Action, the Examiner has rejected claims 1 and 2 under 35 U.S.C. § 102(b) as allegedly being anticipated by Misumi '484.

Applicants respectfully traverse the rejection.

Misumi '484, in Figure 1, teaches a semiconductor element (5) mounted on a substrate (1) through a bump bonding part (elements 2 or 3), wherein a sealing resin layer (4) is provided between the wiring circuit substrate (1) and the semiconductor element (5). Misumi '484 does not disclose, teach or suggest that the semiconductor element is "encapsulated" as required in independent claims 1 and 2 of the present application. For at least this reason Misumi '484 does not anticipate the present claims.

Further, as stated above, the Examiner's statement that all materials have some level of tackiness and that the "thermosetting rubber-containing material" of Misumi '484 meets the claim because the units can be arbitrarily selected to meet the claimed range of 2 to 15 are not technically accurate. For these additional reasons the present claims are not anticipated.

Accordingly, Applicants respectfully request withdrawal of the rejection.

IV. Response to Claim Rejections under 35 U.S.C. § 103

A. Yamamoto '404 in view of Komoto '409

In paragraph 16 of the Office Action, the Examiner has rejected claim 6 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Yamamoto '404 in view of Komoto '409.

Applicants respectfully traverse the rejection.

The Examiner has not made a *prima facie* showing of obviousness. Specifically, as discussed above, Yamamoto '404 does not teach all elements of the invention and Komoto '409 does not remedy the deficiencies of Yamamoto '404. Specifically, neither of Yamamoto '404 nor Komoto '409 teaches: (1) a substrate and a semiconductor element mounted thereon *through a bump bonding part*; or (2) that the semiconductor element has been encapsulated by a thermosetting *sheet* material.

As noted above Yamamoto '404 teaches that the semiconductor element is mounted to the substrate via an adhesive film. The Examiner relies on Komoto '409 for the disclosure of a polyimide adhesive film. Thus, even if combined, at best, one of ordinary skill in the art may have been motivated to substitute the polyimide adhesive film of Komoto '409 for the adhesive film of Yamamoto '404, but the presently claimed invention would not have been achieved.

Accordingly, Applicants respectfully request withdrawal of the rejection.

B. Yamamoto '404 in view of Imashiro '711

In paragraph 17 of the Office Action, the Examiner has rejected claim 6 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Yamamoto '404 in view of Imashiro '711.

Applicants traverse the rejection and submit that the Examiner has not made a *prima facie* showing of obviousness essentially for the same reasons discussed above with respect to the rejection based on Yamamoto '404 in view of Komoto '409. Specifically Imashiro '711 does not remedy the deficiencies of Yamamoto '404 and even if combined, at best one of ordinary skill in the art would have been motivated to substitute the polyimide adhesive film of Imashiro '711 for the adhesive film of Yamamoto '404, but the presently claimed invention would not have been achieved.

Accordingly, Applicants respectfully request withdrawal of the rejection.

C. Hotta '096 in view of Komoto '409

In paragraph 18 of the Office Action, the Examiner has rejected claim 6 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hotta '096 in view of Komoto '409.

Hotta '096 is discussed above. The Examiner relies on Komoto '409 for the teaching of a rubber-modified polycarbodiimide resin for electronic applications.

As noted above, Hotta '096 merely describes filling an encapsulation resin and does not disclose, teach or suggest encapsulation with a sheet having tackiness. Komoto '409 does not remedy this deficiency. Applicants further submit that there is no motivation to combine the references as suggested by the Examiner with a reasonable expectation of success. Even if combined the present invention would not have been achieved since neither reference teaches or suggests encapsulation with a sheet having tackiness as recited in the present claims.

Accordingly, Applicants respectfully request withdrawal of the rejection.

D. Hotta '096 in view of Imashiro '711

In paragraph 19 of the Office Action, the Examiner has rejected claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Hotta '096 in view of Imashiro '711.

Hotta '096 is discussed above. The Examiner relies on Imashiro '711 for the teaching of a rubber-modified polycarbodiimide resin for electronic applications.

As noted above, Hotta '096 merely describes filling an encapsulation resin and does not disclose, teach or suggest encapsulation with a sheet having a tackiness and Imashiro '711 does not remedy this deficiency. Applicants further submit that there is no motivation to combine the references as suggested by the Examiner with a reasonable expectation of success. Even if combined the present invention would not have been achieved since neither reference teaches or suggests encapsulation with a sheet having tackiness as recited in the present claims.

Accordingly, Applicants respectfully request withdrawal of the rejection.

E. Misumi '484 in view of Komoto '409

In paragraph 20 of the Office Action, the Examiner has rejected claim 6 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Misumi '484 in view of Komoto '409.

Applicants respectfully traverse the rejection and submit that the Examiner has not a made a *prima facie* showing of obviousness. As stated above, Misumi '484 does not to disclose, teach or suggest that the semiconductor element is "encapsulated" as required in independent claims 1 and 2 of the present application. Komoto '409 does not remedy this deficiency. Therefore, even if combined, the present invention would have been achieved.

F. Misumi ‘484 in view of Imashiro ‘711

In paragraph 21 of the Office Action, the Examiner has rejected claim 6 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Misumi (‘484) in view of Imashiro (‘711).

Applicants traverse the rejection and submit that the Examiner has not made a *prima facie* showing of obviousness essentially for the same reasons discussed above with respect to the rejection based on Misumi ‘484 in view of Imashiro ‘711. Specifically Imashiro ‘711 does not remedy the deficiencies of Misumi ‘484 and even if combined the presently claimed invention would not have been achieved.

Accordingly, Applicants respectfully request withdrawal of the rejection.

G. Yamamoto ‘404 in view of Nishikawa ‘465

In paragraph 22 of the Office Action, the Examiner has rejected claim 7 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Yamamoto ‘404 in view of Nishikawa ‘465.

Applicants traverse the rejection and submit that the Examiner has not made a *prima facie* showing of obviousness. As discussed above, Yamamoto ‘404 does not teach all elements of the invention and Nishikawa ‘465 does not remedy the deficiencies of Yamamoto ‘404. Specifically, neither of Yamamoto ‘404 nor Nishikawa ‘465 teaches: (1) a substrate and a semiconductor element mounted thereon *through a bump bonding part*; or (2) that the semiconductor element has been encapsulated by a thermosetting *sheet* material. Thus, even if combined, the presently claimed invention would not have been achieved.

Accordingly, Applicants respectfully request withdrawal of the rejection.

H. Hotta '096 in view of Nishikawa '465

In paragraph 23 of the Office Action, the Examiner has rejected claim 7 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hotta '096 in view of Nishikawa '465.

Hotta '096 is discussed above. The Examiner recognizes that Hotta '096 does not teach that the thermosetting material has a ball tack between 2 and 15. The Examiner relies on Nishikawa '465 which describes measurement of tackiness in terms of ball tack.

As noted above, Hotta '096 merely describes filling an encapsulation resin and does not disclose, teach or suggest encapsulation with a sheet having a tackiness and Nishikawa '465 does not remedy this deficiency. Applicants further submit that there is no apparent reason to combine the references and modify the disclosure of Hotta '096 as suggested by the Examiner since Hotta '096 is directed to filling an encapsulation resin and does not mention encapsulation with a sheet. Even if combined the present invention would not have been achieved.

Accordingly, Applicants respectfully request withdrawal of the rejection.

I. Misumi '484 in view of Nishikawa '465

In paragraph 24 of the Office Action, the Examiner has rejected claim 7 under 35 U.S.C. § 103(a) as being unpatentable over Misumi '484 in view of Nishikawa '465.

Applicants respectfully traverse the rejection.

Misumi '484 and Nishikawa '465 are discussed above. Applicants submit that the Examiner has not made a *prima facie* showing of obviousness for the reasons that Nishikawa '465 does not remedy the deficiencies of Misumi '484 and even if combined the presently claimed invention would not have been achieved.

Accordingly, Applicants respectfully request withdrawal of the rejection.

V. Response to Obviousness-Type Double Patenting Rejections

In paragraph 26 of the Office Action, the Examiner has rejected claims 1 and 2 on the ground of non-statutory obviousness-type double patenting as allegedly being unpatentable over claims 1-3 of Hotta '096.

In paragraph 27 of the Office Action, the Examiner has rejected claim 6 on the ground of non-statutory obviousness-type double patenting as allegedly being unpatentable over claims 1-3 of Hotta '096 in view of Komoto '409.

In paragraph 28 of the Office Action, the Examiner has rejected claim 6 on the ground of non-statutory obviousness-type double patenting as allegedly being unpatentable over claims 1-3 of Hotta '096 in view of Imashiro '711.

In paragraph 29 of the Office Action, the Examiner has rejected claim 7 on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-3 of Hotta '096 in view of [Nishikawa '465].¹

Applicants submit a Terminal Disclaimer herewith with respect to Hotta '096, thereby obviating the obviousness-type double patenting rejections.

Accordingly, Applicants respectfully request withdrawal of the rejections.

VI. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

¹ The Action refers to Imashiro '711 which Applicants believe is an error on the Examiner's part.

Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

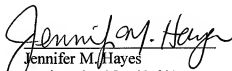
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